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A Pocket Guide to Cold Water Survival

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A Pocket Guide to Cold Water Survival

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A POCKET GUIDE TO COLD WATER SURVIVAL

INTRODUCTION

The purpose of this guide is to examine the hazards of cold exposure that may endanger your life, and to provide you with advice on how to prevent or minimize those dangers. A thorough understanding of the information contained in this booklet may some day save your life.

The sinking of the "Titanic" in 1912 provided a dramatic example of the effects of cold water immersion. Partially due to a lack of preparedness with protective clothing, adequate flotation equipment, and a knowledge of survival procedures, none of the 1,489 persons immersed in the 0°C water was alive when rescue vessels arrived one hour and fifty minutes after the sinking. Countless lives could have been saved had the survivors known more of how to cope with cold water; almost all of the people in lifeboats were alive.

During the second world war the Royal Navy of the United Kingdom alone lost about 45,000 men at sea, of whom it is estimated 30,000 died from drowning and hypothermia. Many of those who drowned did so because of incapacitation due to cold. Even today the pattern is similar.

It is important to realize that you are not helpless to effect your own survival in cold water. Body heat loss is a gradual process, and research shows that in calm water at 5°C a normally dressed person has only a 50 per cent chance of surviving one hour. Simple, self-help

techniques can extend this time, particularly if the person is wearing a lifejacket. You can make the difference; this pamphlet is intended to show you how.

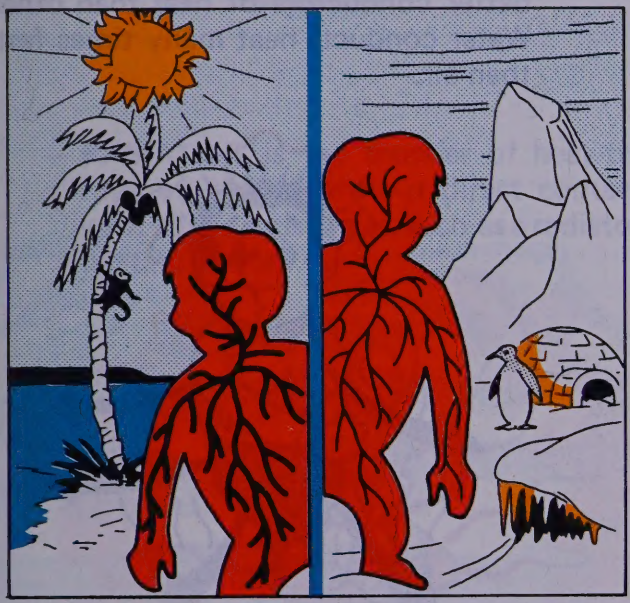
YOUR BODY

An understanding of how your body reacts to cold air or water exposure and knowing the steps you can take to help your body delay the damaging effects of cold stress, will help you in your struggle to stay alive in the event of cold water exposure.

Imagine your body to consist of an inner core and an outer layer. Within the core, your body produces a great deal of heat as a result of normal body functions, such as physical exercise and digesting your food.

Nature requires that your body core be kept at an ideal temperature of 37°C. A network of blood vessels running through the core and the outer layer of your body picks up the heat produced by the "furnace" within the core, and distributes the heat throughout the

body. Nature also gives your body a very accurate system to automatically regulate the core temperature at 37°C. For example, if the temperature around you is high, as on a warm day or in a hot boiler room, the blood vessels near the skin of your body will enlarge, allowing more blood to flow to the outer layer and increase body heat loss. This will keep you comfortable and keep the core temperature (37°C) from rising. If the surroundings are cool, your body will narrow the blood vessels in the outer layer and keep that valuable body heat from being lost too rapidly.



Vessels enlarged *Vessels narrowed*

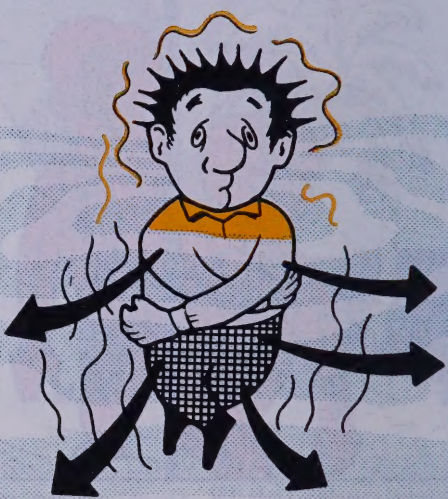
This regulatory system strives to keep the core temperature of the body constant despite variations in ambient temperature around you. The body can only do this within certain limits. There are levels of cold exposure when the body must have help in maintaining the core temperature at nature's choice of 37°C. You

must give it that help by taking the correct actions and wearing protective clothing.

BODY HEAT LOSS AND INSULATION

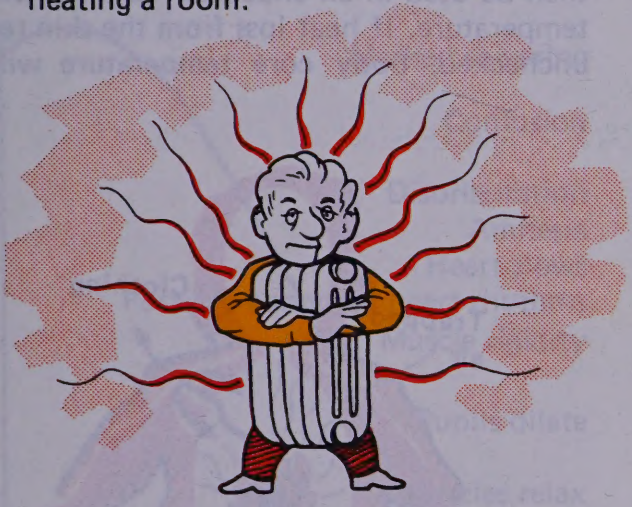
The body gives off its heat to the surroundings in the following ways:

- CONDUCTION is the transfer of heat by direct contact with cold water or other materials. Heat passes from your body, which is at a relatively high temperature, to a substance which is lower in temperature. Certain substances are better conductors of heat than others. Water conducts heat many times faster than air.



- CONVECTION is the transfer of heat by air or water currents. Moving air is far cooler to the body than still air. Cooling by wind is known as the "wind-chill" effect. Similarly, disturbed or moving water around your body is more chilling than still water at the same temperature.

— RADIATION is the transfer of heat by rays of energy without direct contact with other substances, such as a radiator heating a room.



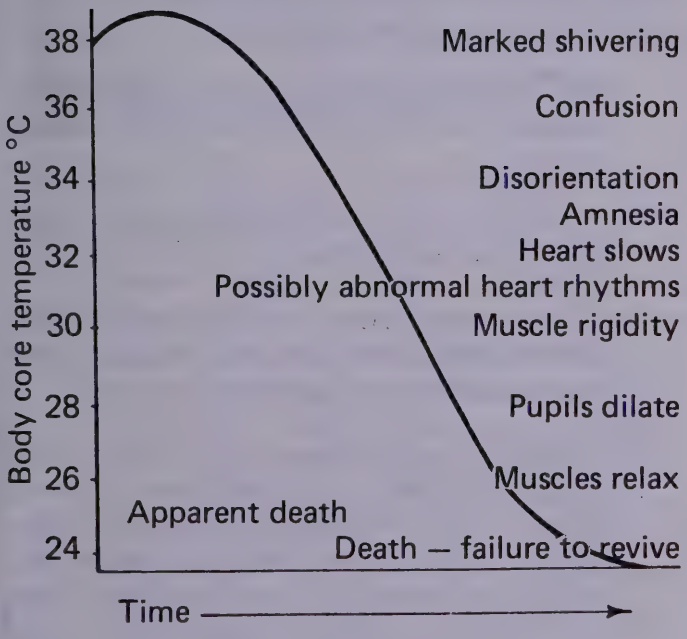
— EVAPORATION is the vaporization, or "drying up", of liquid, such as sweat or moisture from wet clothing. When the body gets too hot, sweating will occur

and the evaporation of this sweat will help to cool the skin. Although sweating can be very useful in providing you with a comfortable cooling effect on a hot day, evaporation of moisture from clothing can rob you of valuable body heat on a cold day.

In almost all parts of the world, man cannot survive without the aid of clothes. Clothes by themselves do not warm the body; the body is actually warmed by its own heat production. The body heat warms the layer of air trapped between the skin and clothing. It is this layer of air that provides insulation. If the layer of air is lost, then the insulation is diminished. This layer of trapped air between skin and clothing may be disturbed by movement or displaced by water. In either case, valuable warm air is displaced and skin temperature will fall. Heat from the body core will then be used in an endeavour to maintain skin temperature. If heat loss from the skin remains unchecked, body core temperature will fall.

HYPOTHERMIA

The loss of body heat is one of the greatest hazards to the survival of a person at sea. The rate of body heat loss depends on water temperature, the protective clothing worn, and the manner in which the survivor conducts himself. An abnormally low body core temperature can be recognized by a variety of symptoms. Very early during exposure, the body tries to combat the excessive heat loss both by narrowing its surface blood vessels (to reduce heat transfer by blood to surface) and by shivering (to produce more body heat). However, if the exposure is severe, the body is unable to conserve or produce enough heat. Body core temperature begins to fall. When body core temperature is below 35°C the person is suffering from "hypothermia".



By then, discomfort, tiredness, poor co-ordination, numbness, impaired speech, disorientation and mental confusion are well established. As the internal temperature decreases below 31°C, unconsciousness may occur; shivering is usually replaced by muscle stiffness, and the pupils of the eyes may be enlarged. The heart becomes irregular and weak and the pulse is barely detectable. Although death may occur at any stage of hypothermia, when a person's temperature is below 30°C it is very difficult to be sure whether he is alive or dead. Death by hypothermia is then defined as a failure to revive on rewarming.

SHIP ABANDONMENT

Records show that many ships sink in less than 15 minutes. This affords little time to formulate a plan of action, so careful pre-planning is essential to be ready in an emergency. Here are some sound pointers for you to remember when abandoning ship:

1 Put on as much warm clothing as possible, making sure to cover head, neck, hands and feet.

2 If an immersion suit is available put it on over the warm clothing.

3 If the immersion suit does not have inherent flotation, put on a lifejacket and be sure to secure it correctly.

4 All persons who know that they are likely to be affected by seasickness should, before or immediately after boarding the survival craft, take some recommended preventive tablets or medicine in a dose recommended by the manufacturer. The incapacitation caused by seasickness interferes with your survival chances; the

vomiting removes precious body fluid, while seasickness in general makes you more prone to hypothermia.

5 Avoid entering the water if possible, e.g. board davit-launched survival craft on the embarkation deck. If davit-launched survival craft are not available, use over-side ladders, or if necessary lower yourself by means of a rope or fire hose.

6 Unless it is unavoidable do not jump from higher than 5 metres into the water. Try to minimize the shock of sudden cold immersion. A sudden plunge into the cold water can cause rapid death or an uncontrollable rise in breathing rate may result in an intake of water into the lungs. On occasions it may be necessary to jump into the water; if so, you should keep your elbows to your side, cover your nose and mouth with one hand while holding the wrist or elbow firmly with the other hand. One should not jump into the water astern of the liferaft in case there is any remaining headway on the ship.

7 Once in the water, whether accidentally or by ship abandonment, orientate yourself and try to locate the ship, lifeboats, liferafts, other survivors or other floating objects. If you were unable to prepare yourself before entering the water, button up clothing now. In cold water you may experience violent shivering and great pain. These are natural body reflexes that are not dangerous. You do, however, need to take action as quickly as possible before you lose full use of your hands; button up clothing, turn on signal lights, locate whistle, etc.

8 While afloat in the water, do not attempt to swim unless it is to reach a nearby craft, a fellow survivor, or a floating object on which you can lean or climb. Unnecessary swimming will "pump" out any warm water between your body and the layers of clothing, thereby increasing the rate of body heat loss. In addition, unnecessary movements of your arms and legs send warm blood from the inner core to the outer layer of the body. This results in a very rapid heat loss. Hence it is most important to remain as still as possible in the water, however painful it may be. Remember, pain will not kill you, but heat loss will!

9 The body position you assume in the water is also very important in conserving heat. Float as still as possible with your legs together, elbows close to your side and arms folded across the front of your lifejacket. This position minimizes the exposure of the body surface to the cold water. Try to keep your head and neck out of the water.

10 Try to board a lifeboat, raft, or other floating platform or object as soon as possible in order to shorten the immersion time. Remember, you lose body heat many times faster in water than in air. Since the effectiveness of your insulation has been seriously reduced by water soaking, you must now try to shield yourself from wind to avoid a wind-chill effect (convective cooling). If you manage to climb aboard a lifeboat, shielding can be accomplished with the aid of a canvas cover or tarpaulin, or an unused garment. Huddling close to the other occupants of the lifeboat or raft will also conserve body heat.

11 Keep a positive attitude of mind about your survival and rescue. This will improve your chances of extending your survival time until rescue comes. Your will to live does make a difference!

TREATMENT OF THE IMMERSION SURVIVOR

The treatment for hypothermia will of course depend on both the condition of the survivor and the facilities available. Generally speaking, survivors who are rational and capable of recounting their experiences, although shivering dramatically, merely require removal of all wet clothes and replacement with dry clothes or blankets. Hot sweet drinks, and rest in a warm environment not exceeding 22°C (normal room temperature) are also recommended. However, always bear in mind that even conscious survivors can collapse and become unconscious shortly after rescue. Alcohol should be avoided at all costs.

In more serious cases, where the survivor is not shivering and is semi-conscious, unconscious, or apparently dead, immediate first aid

measures will be necessary to preserve life while awaiting medical advice on more detailed management procedures. The recommended first aid measures for such an immersion survivor are as follows:

1 On rescue always check the survivor's breathing;

2 If the survivor is not breathing, ensure the airway is clear and start artificial respiration immediately (mouth to mouth or mouth to nose);

3 Attempts at resuscitation should be continued for at least 30 minutes if medical advice is not available.

4 If the survivor is breathing but unconscious, lay him in the unconscious position as illustrated.

This is necessary to ensure that the person's breathing is not obstructed by his tongue or by vomit.

5 Avoid all unnecessary manhandling; do not even remove wet clothes; do not massage.

6 Prevent further heat loss through evaporation and from exposure to the wind. Wrap the patient in blankets and transfer him immediately below decks to a compartment at between 15°C and 20°C, preferably keeping him horizontal, slightly head down.

7 Seek advice by radio on further treatment; advice on rewarming and decisions with regard to further treatment should then be given by a doctor.

Safest positions for an unconscious person

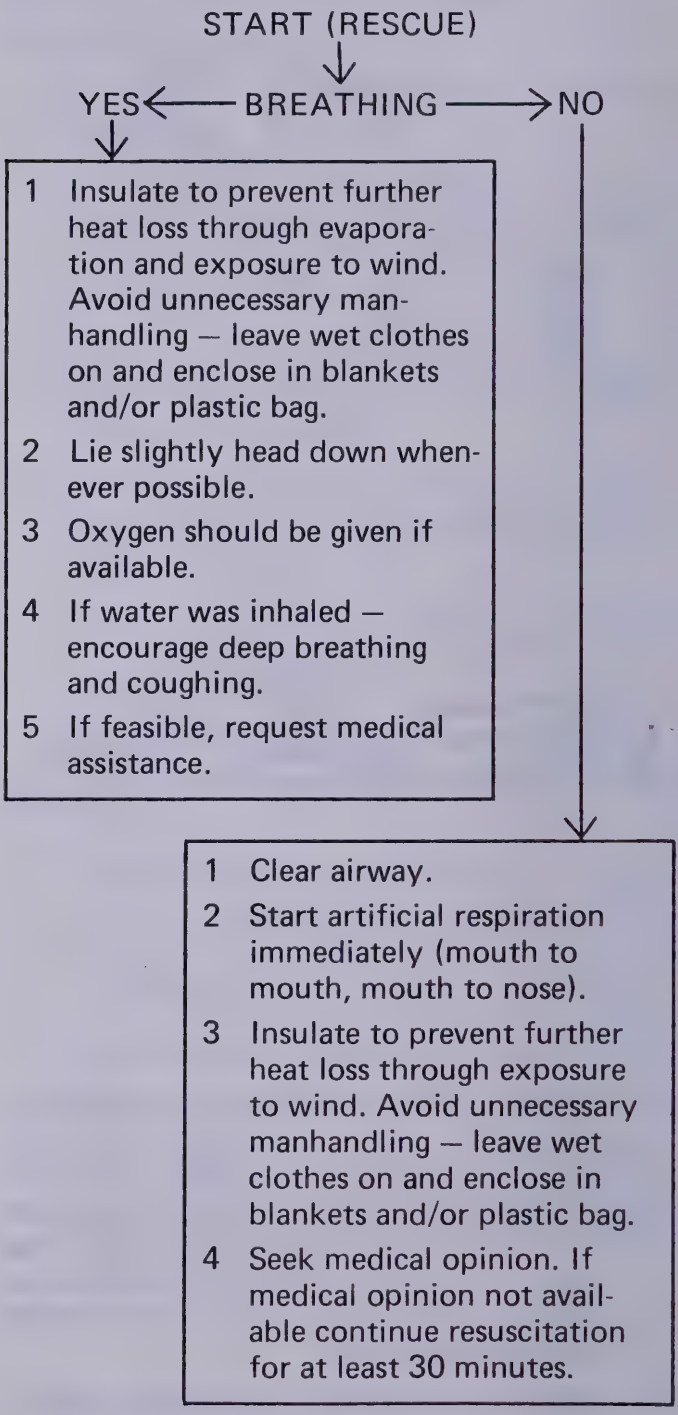
A

B

A — On deck. The position for an unconscious person: on his left side, with both arms bent at the elbow, the right elbow and the right leg bent at the knee helping to prevent him from rolling over on to his face. His clothes have been loosened at the neck and waist and his artificial teeth have been removed.

B — Position in bed for an unconscious person.

The above basic guidelines on first aid treatment are illustrated diagrammatically below:


START (RESCUE)
BREATHING
YES
NO
1 Insulate to prevent further heat loss through evaporation and exposure to wind. Avoid unnecessary manhandling – leave wet clothes on and enclose in blankets and/or plastic bag.
2 Lie slightly head down whenever possible.
3 Oxygen should be given if available.
4 If water was inhaled – encourage deep breathing and coughing.
5 If feasible, request medical assistance.
1 Clear airway.
2 Start artificial respiration immediately (mouth to mouth, mouth to nose).
3 Insulate to prevent further heat loss through exposure to wind. Avoid unnecessary manhandling – leave wet clothes on and enclose in blankets and/or plastic bag.
4 Seek medical opinion. If medical opinion not available continue resuscitation for at least 30 minutes.

COLD INJURY

Another problem confronting a survivor in cold environments is the threat of acquiring a cold injury. Such injuries usually result from prolonged exposure to low ambient temperatures, especially when wind speeds are high. Cold injuries may be of a freezing or non-freezing variety.

1 Freezing cold injury (frostbite)

Frostbite is the term given to the condition when tissue fluids freeze in localized areas of the body; the hands, face and feet are particularly susceptible.

Cause

Exposure, particularly of bare skin to sub-zero temperatures especially when combined with air movement. Look-outs in liferafts or survivors in open boats are particularly prone to this injury. Accordingly, consideration should be given to the length of watch period.

Diagnosis

The signs are:

.1 extreme waxy pallor of the skin;

.2 initial local tingling and stiffness when it is difficult to wrinkle the face or wriggle affected toes or fingers;

.3 complete absence of sensation in the area affected; and

.4 local hardness due to freezing of the flesh.

Be watchful for the early signs of frostbite in yourself and in others.

Prevention

If bare skin has to be exposed to the elements, the periods of exposure should be kept to a minimum and freezing winds particularly avoided. Moderate exercise and massage at an early stage will help to prevent the onset of cold injury. *DO NOT* smoke; smoking reduces the blood supply to the hands and feet.

Treatment

On detection of the above signs, immediate steps should be taken to re-warm the frozen part before permanent damage occurs. Get out of the wind. Re-warm the frozen areas by applying them to a warmer part of the body e.g. hands under armpits, cupped hand over cheek, nose, ear, etc. Once freezing has occurred *DO NOT* rub or massage affected areas.

2 Non-freezing cold injury (immersion foot)

This is a term given to the condition when the temperature of local tissues in the limbs (usually the feet) remains sub-normal but above freezing for a prolonged period. It is commonly encountered by shipwreck survivors who have been adrift and cold for several days. Usually the feet have been wet and immobile, but this injury can occur in dry conditions. Other contributory factors are tight footwear and sitting still with the feet down, as when sitting in a chair for prolonged periods.

Diagnosis

Feet become white, numb, cold and frequently are slightly swollen. When returned to the warmth the feet become hot, red, swollen and usually painful.

Prevention

Every effort should be made by survivors to keep their feet warm and dry. Shoe laces should be loosened; the feet should be raised and toe and ankle exercises encouraged several times a day. When possible, shoes should be removed and feet kept warm by placing them under the armpits, but outside the clothing, of an adjacent occupant. Alternatively, unwanted spare clothing may be wrapped round the feet to keep them warm. Smoking should be discouraged.

Treatment

After rescue every effort should be made to avoid rapid rewarming of the affected limbs. Care should be taken to avoid damaging the skin or breaking blisters. *DO NOT* massage affected limbs.

SUMMING UP

We have briefly explained how your body responds to cold, what you can do to help ward off the harmful effects of cold, and finally, how to administer aid to an immersion survivor.

We will now sum up the story with a number of important reminders. Follow them, for your life may depend on them!

1 Plan your emergency moves in advance! Ask yourself what you would do if an emergency arose. Where is your nearest exit to the deck for escape? Where is the nearest available immersion suit, lifejacket, lifeboat, or raft? How would you quickly get to your foul weather gear,

insulated clothing, insulated gloves, distress signal, etc.?

2 Know how your survival equipment works. The time of the emergency is not the time to learn.

3 Even in the tropics, before abandoning ship, wear many layers of clothing to offset the effects of cold. Wear an immersion suit if available.

4 Put on a lifejacket as soon as possible in an emergency situation.

5 When abandoning ship, try and board the lifeboat or raft dry if you can.

6 If immersion in water is necessary, try to enter the water gradually.

7 Swimming increases body heat loss. Swim only to a safe refuge nearby.

8 To reduce your body heat loss, float in the water with your legs together, elbows to your side and arms across your chest.

9 In a survival situation, you must force yourself to have the will to survive. This will very often make the difference between life and death.

In conclusion, advance planning, preparation, and thought on your part can be the most significant factors in your struggle with cold water immersion and in your survival. Familiarize yourself with the contents of this booklet.

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